Chapter 11: Energy Use in the Agricultural Sector

For additional charts and graphs related to agricultural energy use, please refer to the *Kansas Energy Chart Book*, Chapter 11 (http://kec.kansas.gov/chart_book/).

Overview

Energy costs made up about 23% of U.S. crop production expenses from 2000 to 2003, compared with just 6% for livestock production. However, livestock operations experience higher energy costs indirectly through higher feed costs, which make up about 60% of all production costs. In Kansas, rising energy prices have hit Kansas irrigated crop producers especially hard.[1]

Based on 2002 data, the most recent available, direct energy consumption by the U.S. agricultural sector comprised only 1.1% of the nation's total energy consumption. Thus, reducing energy use in agricultural activities will have minimal impact on overall energy consumption in Kansas, even though about 94% of the state's land is used for agricultural production and wildlife habitat.

In addition, it is important to recognize that Kansas agricultural producers already tend to use energy efficiently because fuel and other energy-related costs associated with crop and livestock production significantly affect net profits. Total energy usage in agriculture has fallen about 28% since the late 1970s.

Nonetheless, energy use in crop production can be substantially reduced through the adoption of no-till or reduced-till cultivation and residue management. No-till, as the name suggests, means leaving the residue from last year's crop undisturbed until planting. Other conservation tillage systems include ridge-till and mulch-till. In ridge-till, planters using specialized attachments scrape off the top two inches of the four- to six-inch ridges formed at cultivation before placing the seed in the ground. Mulch-till is a full-width tillage system that usually involves only one or two tillage passes, leaving at least a third of the surface covered with residue. On the other end of the spectrum is conventional or intensive-till, a full width tillage system in which field residue covers less than 15% of the soil.[2]

No-till substitutes herbicides for tillage to kill weeds. Studies conclude that fuel costs per harvested acre on no-till farms are about 67–75% of those associated with continuous or reduced tillage.

---

[1] Except where otherwise noted, data in this section comes from *Energy Use in the Kansas Agricultural Sector: Report Submitted to the Kansas Energy Council*, June 15, 2006, by Terry Kastens, Kevin Dhuyvetter, James Mintert, Richard Nelson, and Xianghong Li; and from *Staff Analysis of the KEC Background Report: Energy Use in the Kansas Agricultural Sector*, August 2006, by Debra Baker and Tom Lowe. Both reports are available on the KEC web site (http://www.kec.kansas.gov/reports.htm).

[2] Based on information from the education brochure, *What's Conservation Tillage?*, produced by the Conservation Technology Inforamtion Center (www.ctic.purdue.edu).

Adoption of no-till cultivation provides the following additional benefits:

- decreased soil erosion;
- increased use of field buffer strips;
- improved timing of applications;
- decreased runoff due to rainfall and, thus, reduced herbicide runoff;
- increased retention of organic matter in the soil, which improves soil health and productivity, while increasing infiltration of rainwater;
- increased watershed health (because no-till more closely mimics undisturbed hydrologic conditions, while decreasing erosion.

Another benefit of no-till is the increased ability to sequester carbon in the soil, which can reduce greenhouse gases. Plants convert CO_2 and water to organic matter, removing a significant greenhouse gas from the atmosphere. In addition, there is an evolving market to pay producers for carbon credits to offset CO_2 emissions from other sectors of society.

Despite these benefits, since 1990 the rate of conversion to no-till has been relatively slow in Kansas and in the rest of the surrounding states. In addition to a reluctance to change from traditional farming practices, adoption of no-till has also been hindered by the need for equipment modifications and for more information on crop rotations to maximize production.

Existing Policies and Programs

Numerous federal and state programs already exist to promote soil conservation, protection of water quality, flood management, habitat enhancement, and other objectives. State and federal cost-share dollars are available for many practices that contribute to energy reduction and carbon sequestration, in addition to addressing the natural resource concerns for which they were originally developed.

In 2004, the state initiated a watershed-based management strategy, the Kansas Watershed Restoration and Protection Strategy (WRAPS). WRAPS integrates existing conservation programs and practices based on watershed plans.

With this program, local entities develop plans to address watershed conditions and concerns, which in turn guide establishment of goals and objectives to restore watersheds to a more properly functioning condition. Implementation of these goals and objectives is largely accomplished through programs and practices administered under the conservation programs just mentioned.

A major focus of the WRAPS program is to develop watershed plans that will reduce the amount of sedimentation occurring in public water supply reservoirs. The majority of these watersheds are primarily rural, and land use is predominately agricultural.

When working with producers to encourage them to adopt practices that will reduce sedimentation and other sources of pollution, the challenge is always to demonstrate how

making a change in practices will improve the producers' profit. While they may agree that reducing sedimentation and prolonging the life of reservoirs is a worthy goal, few producers are willing to change behavior or practices solely for those reasons.

Many of the conservation programs promote farming practices that also result in energy savings and carbon sequestration. And they offer cost share dollars to the producer to adopt them. However, these additional benefits are rarely mentioned in the program literature.

An example of this is the widely known and very successful Conservation Reserve Program or CRP, which began in 1986. Its purpose is to remove marginal and highly erodible land from crop production and convert it to perennial native grass cover.

Obvious benefits of enrolling this marginal land include wildlife habitat improvement, water and air quality improvement, and erosion control. What is not currently considered is the carbon sequestration benefits of native perennial grass cover, and reduced energy costs back due to lack of cultivation of the ground. Cost share and rental agreement contracts are offered to landowners to establish the grass cover and to offset the income lost from taking the land out of production.

Currently, about 1.6 million acres of CRP contracts will expire in the next several years. Due to changes in the program qualifications, not all of these acres will be eligible to re-enroll with the existing rental payments. It is expected that about 54% of these acres will either be grazed or broken out into cropland again.

If the acres are converted to cropland, many of the environmental benefits will be lost unless they are converted to no-till residue management. These producers should be encouraged to either keep the land in CRP or adopt management practices that will maximize energy reduction, carbon sequestration, and natural resource concerns.

The WRAPS program can be instrumental in promoting conservation practices that accomplish all of this. For example, if acres in CRP are identified in a watershed plan as being important to achieving or maintaining watershed goals, increased targeting of existing programs to work with specific producers can be done to either maintain the acres in grassland or to encourage management practices on the cropped or grazed land that maximizes energy savings, carbon sequestration and overall watershed function.

There is an emerging market for "carbon credits" as various entities are beginning to use them to offset carbon emissions into the atmosphere. The CCX is hoping to trade U.S. credits in Europe where many companies are located in countries that have signed the Kyoto Protocol.

In October, 2006 the Kansas Farmers Union announced an agreement had been reached with the Chicago Climate Exchange (CCX) to allow the Farmers Union to enroll eligible producer acreages into blocks of credits that will be traded by the exchange.